A Novel Approach on Ceiling Fan Based System to Avoid Suicide by Hanging

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ABSTRACT: **Suicide by hanging is very alarming in India. As per report of National Crime Records Bureau (NCRB), Government of India, quite good number of hanging cases is reported every year. Most of the hanging cases are commonly suicidal. Homicidal case subsequently creating a scene of hanging is extremely rare. In order to distinguish between suicidal/homicidal hangings, the examination of crime scene on various key points in undisturbed condition followed by autopsy study is necessary to discover the real fact. The objective of this study was to focus on various factors associated with suicide by hanging at India with a view to identify the areas of intervention. In order to overcome these problem the main objective of the project is to reduce the suicide attempts occurring through ceiling fan.**

The proposed project design consists of ceiling fan with hardware components of RENESAS microcontroller, PIR and Force sensor, Buzzer, GSM module, switch and DC motor. And software used are Cube suite+ and RENESAS flash programmer. Whenever the person tries to hang the force sensor senses the set weight, if it's more than the set point weight, the beam gets elongated and comes down. In addition to these the alarm is sounded and GSM sends the message to the particular guardians. Provided with the help of algorithm the speed and movement of the beam is monitored.

Keywords: Ceiling Fan, Automation, CubeSuite+

I. INTRODUCTION

Suicide is a major socioeconomic and public health issue worldwide. Hanging is one of the 10 leading causes of death in the world accounting more than a million deaths annually. In India, hanging is second common method of committing suicide after poisoning. Over the past 30 years the incidence of suicide by hanging is on increase, especially among young adults. The fact that 71% of suicides in India are by persons below the age of 44 years imposes a huge social, emotional and economic burden on our society. Its prevention is still a challenging job for public health authorities. A detailed knowledge of various factors associated with suicidal hanging in that particular geographical area is very much necessary to prevent such suicides. Keeping this in mind we conducted a prospective study at India, to focus on the various factors associated with suicidal hanging; with a view to identify the areas of intervention.

In order to overcome these problem the main objective of the project is to reduce the suicide attempts occurring through ceiling fan.The proposed project design consists of ceiling fan with
hardware components of RENESAS microcontroller, PIR and Force sensor, Buzzer, GSM module, switch and DC motor. And software used are Cube suite+ and RENESAS flash programmer.
Whenever the person tries to hang the force sensor senses the set weight, if it's more than the set point weight, the beam gets elongated and comes down. In addition to these the alarm is sounded and GSM sends the message to the particular guardians. Provided with the help of algorithm the speed and movement of the beam is monitored.

II METHODOLOGY

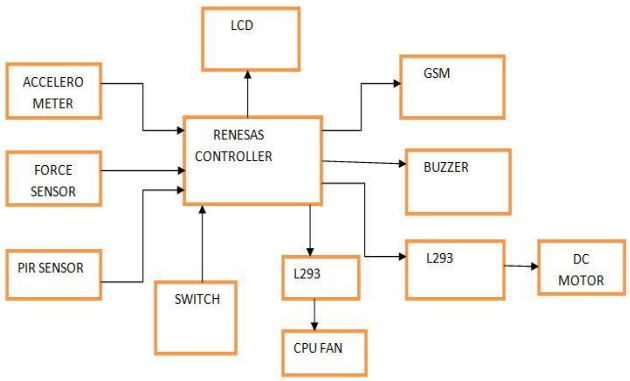

Figure 1: Block diagram of a novel approach on ceiling fan based system to avoid suicide by hanging

The main objective of the project is to reduce the suicide attempts occurring through ceiling fan.The proposed project design consists of ceiling fan with
hardware components of RENESAS microcontroller, PIR and Force sensor, Buzzer, GSM module, switch and DC motor. And software used are Cube suite+ and RENESAS flash programmer.The microcontroller located at the centre of the block diagram forms the control unit of the entire project.Fordemo concern, we are using DC motor which gives the movement for Fan this motor requires L293 driver circuit to drive. Here accelerometer is used to know the human

movement, based on the accelerometer values we are considering the person is trying to hanging. Whenever the person tries to hang the force sensor senses the set weight, if it's more than the set point weight, the beam gets elongated and comes down. In addition to these the alarm is sounded and GSM sends the message to the particular guardians.
Provided with the help of algorithm the speed and movement of the beam is monitored.

DEMO POINTS:

A prototype module will be developed for the project. It includes individual PCB boards for all interfaces according to the block diagram. Every PCB will be inter-connected with jumper wires.

The hardware and software used to design the home gateway and device nodes have also been presented in the same work

LCD: For demo concern and is used to display all ongoing information

GSM: It will be responsible for sending and receiving the messages.

A person having central control and its data will be able to know about a home's intimate and private information from the data at its disposal, like if a home's room AC is off or on, this may cause serious privacy concerns.

Accelerometer: It is used to detect the human movements.

L293: It is used as driver for the DC motor.

Switch: It is used for indicating upward movement.

PIR Sensor : It is used to detecting the human presence.

III. IMPLEMENTATION

The complete implementation of the system is shown in fig 2. The following components are used

- RENESAS Microcontroller
- PIR Sensor
- Force Sensor
- BUZZER
- ACCELEROMETER
- LCD Display

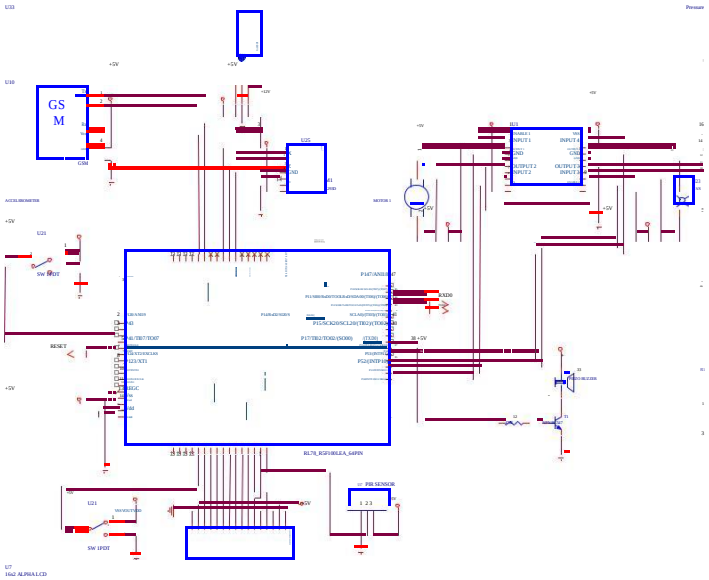

Figure 2: Overall schematic diagram of a novel approach on ceiling fan based system to avoid suicide by hanging.

A. *RENESAS MICROCONTROLLER*

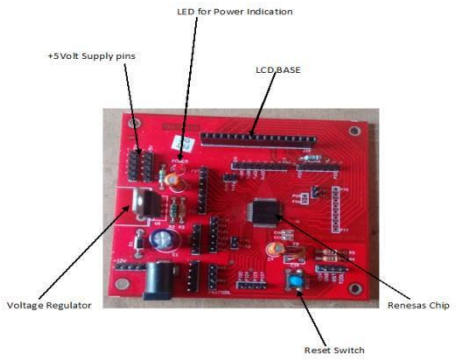

Figure 3: RENESAS Microcontroller Pin Diagram

- General-purpose register: 8 bits × 32 registers (8 bits × 8 registers × 4 banks)
- ROM: 512 KB, RAM: 32 KB, Data flash memory: 8 KB
- On-chip high-speed on-chip oscillator
- On-chip single-power-supply flash memory (with prohibition of block erase/writing function)
- On-chip debug function

B. *FORCE SENSOR*

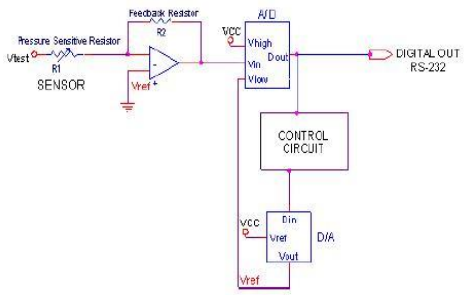

Figure 4: Circuit Diagram of Force sensor

A Force Sensor is defined as a transducer that converts an input mechanical force into an electrical output signal. In our prototype model whenever the person tries to hang the force sensor
senses the set weight, if it's more than the set
point weight, the beam gets elongated and comes down. Therefore the pressure applied on the
person's neck will be reduced and simultaneously the person's feet's will touch the ground.. A
Force-sensing resistor is a material whose resistance changes when a force or pressure applied. They are also known as force sensitive resistor. It is made up of steel, aluminum, or Beryllium-copper alloy. Force sensor works at 40 kHz. Ideal for innovative product design - thin, light weight, low power requirements. Force as the accuracy of ±5% full scale.

C. PIR SENSOR

Figure 5: PIR sensor and its interface

A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensor are commonly used in security alarms and automatic lighting application. In our prototype model PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. If the person is in the range of sensing distance(20 meters) the ceiling fan automatically ON's ,if not it automatically OFF's. Therefore Energy conservation can be obtained. Basically sensors are small, inexpensive, low-power, easy to use and are basically made of a pyro electric sensor.

Specification:

- On board PIR Sensor.
- Output: Digital pulse high (3V) when triggered (motion detected) digital low when idle (no motion detected).
- Power supply: 5V-12V input voltage for most modules (they have a 3.3V regulator), but 5V is ideal in case the regulator has different specs
- Sensitivity range: up to 20 feet (6 meters) 110° x 70° detection range.

D. *BUZZER*

Figure 6: Buzzer and its interface

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. It's also an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. In our prototype model if suicidal hanging cases are taking place in privacy place,the Buzzer will buzzes out makes the indication to their belongings who are outside from privacy place. Active buzzer 5V Rated power can being connected to a continuous sound.

Specifications:

- On-board passive buzzer
- On-board 8550 triode drive
- Cancontrolwithsingle-chip
- microcontroller IO directly
- Working voltage: 5V
- Board size: 22 (mm) x12 (mm)

Pin Configuration:

- VCC
- Input
- Ground

IV. SOFTWARE ASPECTS

A. CUBE SUITE+

Integrated development environment provides simplicity, security, and ease of use in developing software through iterative cycles of editing, building and debugging that typifies software development .Easy to install and operate, Cube Suite offers a highly user friendly development environment featuring significantly shorter build times and graphical debug functions. The robust lineup of expanded functions and user support functions ensures a dependable environment for all users basic software tools for developing software for RENESAS MCUs immediately after the initial installation. Cube Suite+ is also compatible with RENESAS hardware tools including the E2 and E1 on chip debugging emulators which facilitates advanced debugging. Abundant extensions and functions for user support ensures a dependable environment for all users.

B. RENESAS FLASH PROGRAMMER

The RENESAS Flash Programmer provides usable and functional support for programming the on chip flash memory of RENESAS microcontroller in each phase of development and mass production.

V. RESULTS AND DISCUSSION

Figure 7: Photograph of a Ceiling Fan Based System to Avoid Suicide by hanging system prototype.

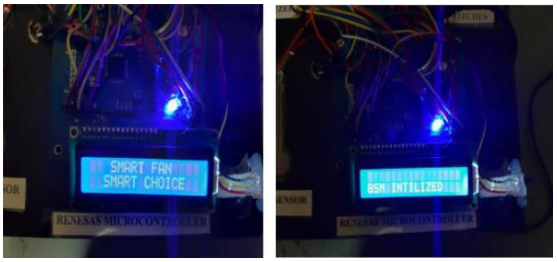

Figure 8: Images showing the Initialization of the system with display of project title name.

Figure 8: Images showing the weight sensed by the Force Sensor and emergency message sent by the GSM module.

Whenever the person tries to hang the force sensor senses the set weight, if it's more than the set point weight, the beam gets elongated and comes down. In addition to these the alarm is sounded and GSM sends the message to the particular guardians.

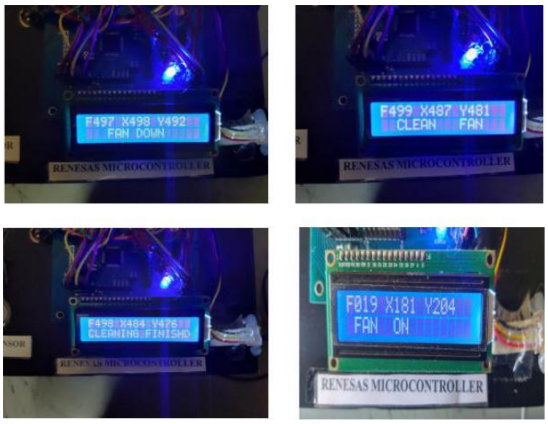

Figure 9: Images showing the automation of ceiling fan display for usage of House hold application.

Ceiling fan can be automated up and down with the help of toggle switches for the household cleaning purpose and PIR sensor can be used for sensing the human motion, if yes the Fan automatically ON's if not it OFF's. Therefore the Energy conservation can be done.

ADVANTAGES

1. Eliminates ceiling fans from being used as aids to committing suicide.
2. Automatic ON/OFF Control using PIR Sensor.
3. Energy conservation.
4. System scalability and easy extension.
5. Integration of mobile devices

CONCLUSION

The prototype model is designed using structured modeling and is able to provide the desired results. It can be successfully implemented as a Real Time system with certain modifications. Science is discovering or creating major breakthrough in various fields, and hence technology keeps changing from time to time. Going further, most of the units can be fabricated on a single along with microcontroller thus making the system compact thereby making the existing system more effective. To make the system applicable for real time purposes components with greater range needs to

be implemented.

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